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**CLOSURE CAP FOR TWO PART PACKAGE**
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(57) Claim

1. A two component package comprising a bottle and a closure cap mounted rotatably thereon, said closure cap including a reservoir for receiving a concentrate, wherein:

(a) the closure cap has a collar arranged to extend into a neck of the bottle from a base of the closure cap, and

(b) said collar formed with a collar thread to engage an inner surface of ~~an outer wall of~~ a hollow cylindrical inner container, said container being closed at one end by a base thereby forming said reservoir, and

(c) between said inner container and said bottle neck, a rotation stop means is provided which prevents free rotation of the inner container.

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Complete Specification for the invention entitled:

CLOSURE CAP FOR TWO-COMPONENT PACKAGE

Reg 8  
(2)

The following statement is a full description of this invention  
including the best method of performing it known to us :-

The invention relates to closure caps for two-component packages.

Two-component packages are known wherein a vessel containing a diluent carries a closure  
5 cap containing a concentrate. By manipulating the closure cap the user is able to open a reservoir containing the concentrate so that the concentrate and diluent are mixed together without the user coming into contact with the concentrate.

10 From British Patent 10 83 335, an apparatus for storing and mixing two components is known, in which a screw cap which carries a reservoir in which one component is enclosed is used as the closure cap. This reservoir is constructed as  
15 a small pot with a flat bottom and is placed on a collar extending radially from the base of the screw cap into the fill opening. When the cap is screwed up, the pot serving as a reservoir is held, by means of an upper annular flange, at a  
20 specific height in the neck of the bottle, whilst the lower edge of the collar tears off the base of the pot along a weakened line and thus enables the component stored in the bottle (referred to as a diluent hereinafter) to be mixed with the  
25 component stored in the reservoir (referred to as a concentrate hereinafter).

Furthermore, from German Gebrauchsmuster  
75 31 452, a similar type of apparatus is known in which the part of the closure cap constructed  
30 as a reservoir consists of a cylindrical wall element projecting into the neck of the bottle and sealed off at the top by a base of the closure cap and at the bottom by a base plate which is removable. The base plate is pressed towards the wall element  
35 by means of a retaining member extending from the base of the closure cap so as to form a chamber which is outwardly sealed.

These known closure caps have a number of disadvantages which affect the usefulness of the two-component package.

Thus the components which are stored side  
5 by side in the reservoir and bottle are not reliably separated from each other. If, for example, liquids such as plant pesticide concentrates and a diluent, or other organic solvents or emulsifiers, are present as one component of the two component system, there  
10 are problems of leaktightness particularly at the weakened breakage point at the junction between the collar and the reservoir or at the junction between the base plate and the wall element.

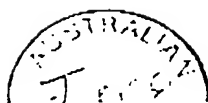
Moreover, some of the two component packages  
15 known in the prior art can be opened by simply unscrewing the closure cap, and the two components thus separated from each other. However, the intention with two component packages is usually that it should only be possible to remove the finished  
20 mixture of the two components. Separation into the individual components is contrary to the safe use which the two component package is intended to ensure.

Also in the closure caps known according  
25 to the prior art the reservoir may only be manufactured from certain materials, depending on the type of closure cap, the rigidity of the base plate, and/or the leaktightness of devices used as sealing elements or of the weakened point, thus greatly restricting  
30 the choice of materials with regard to mechanical properties.

~~Viewed from one aspect the present invention~~  
provides a closure cap adapted to be mounted rotatably on the neck of a bottle or other container to form  
35 a two-component package, the closure cap containing a reservoir intended to receive a concentrate,  
~~wherein:~~

-3a-

The present invention provides a two component package comprising a bottle and a closure cap mounted rotatably thereon, the closure cap including a reservoir for receiving a concentrate, wherein:



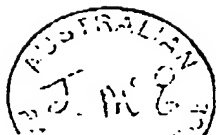
(a) the closure cap has a collar arranged to extend into a neck of the bottle from a base of the closure cap, and

5 (b) said collar formed with a collar thread to engage an inner surface of ~~an outer wall of~~ a hollow cylindrical inner container, said container being closed at one end by a base thereby forming said reservoir, and

10 (c) between said inner container and said bottle neck, a rotation stop means is provided which prevents free rotation of the inner container.

In a preferred embodiment, said inner container includes a frangible portion and said collar is formed with an abutment edge at its lower end which engages said  
15 frangible portion of said inner container such that when the inner container, screwed onto the collar thread, is rotated in a direction of engagement with the collar thread, the frangible portion is severed from said inner container.

20 Said inner container may further have, on its upper portion, an annular flange which extends radially outward and abuts on the bottle neck, such annular flange defining a depth of suspension of the inner container into the bottle and acting to block free rotation of the inner container.



- 4a -

By the interaction of the components of the invention as specified above, it is possible to produce closure caps in which the inner container, acting as a reservoir, is unscrewed by rotary movement of the closure cap from the collar thread (combination of elements a), b) and c) or in which the inner container is severed by the lower part of the collar, which is constructed as an abutment edge, so that the reservoir opens towards the diluent stored in the bottle. Further advantageous effects are achieved in addition to improvements over the prior art mentioned.

~~By the interaction of the components of the~~  
invention as specified above, it is possible to  
produce closure caps in which the inner container,  
acting as a reservoir, is unscrewed by rotary movement  
5 of the closure cap from the collar thread (combination  
of elements a), b) and  $c_1$ ) or in which the inner  
container is severed by the lower part of the collar,  
which is constructed as an abutment edge, so that  
the reservoir opens towards the diluent stored  
10 in the bottle (combination of elements a), b),  
 $c_2$ ) and  $c_{2.1}$ ) or  $c_{2.2}$ ). Further advantageous effects  
are achieved in addition to improvements over the  
~~prior art mentioned.~~

With regard to the following description  
15 of specific embodiments of closure caps according  
to the invention, it should be particularly emphasised  
that the specific form of individual elements described  
by way of example in the particular embodiments  
may readily be transferred to other embodiments  
20 of closure caps according to the invention by anyone  
skilled in the art.

Some embodiments of the invention will now  
be described by way of example and with reference  
to the accompanying drawings, in which:-

25

Figure 1, is an exploded view of the components  
of a first device according to the invention, comprising  
a bottle neck, a screw cap with an unscrewable  
inner container, and a rotation stop acting in  
30 one direction of rotation;

Figure 2a is a cross-sectional view of the  
device of Figure 1 in its assembled condition;

35

Figure 2b is a cross-section through a rotation  
stop which blocks rotation in one direction;



- 6 -

Figure 2c is a cross-section through a rotation stop which blocks rotation in both directions;

Figure 3 is an exploded view of the components of a second device according to the invention comprising a clip-in base, a clip-in cap, an unscrewable inner container, and a bottle neck;

Figure 4a shows the bottle neck and clip-in cap of Figure 3 when assembled;

Figure 4b is a cross-sectional view of the bottle neck and closure cap of Figure 3 in their state ready for use before the internal container has been unscrewed;

Figure 4c is a cross-section through a rotation stop arranged to block rotation in both directions;

Figure 4d is a cross-section through a rotation stop arranged to block rotation in one direction;

Figure 5a shows another embodiment comprising a bottle neck with a screw cap and a divisible inner container;

Figure 5b shows the device of Figure 5a with the reservoir opened;

Figure 6 is an exploded view of the components of a further embodiment incorporating a click-in base, a click-in cap, a divisible inner container with either a flat base or deep base, and a bottle neck;

Figure 7a shows the bottle neck of Figure 6 with the click-in cap screwed on;

Figure 7b shows the bottle neck and closure cap of Figure 6 in the position ready for use before severing of the divisible internal container;

5        Figure 7c is a cross-section through a rotation stop effective in both directions of rotation; and

10        Figure 7d is a cross-section through a rotation stop effective in one direction of rotation.

Figure 1 shows an embodiment of a closure cap according to the invention in which the cap can be screwed onto a bottle neck 2 by means of a thread 17, hereinafter referred to as bottle thread. An inner container 5 is held in the closure cap by a thread 4 associated with a collar 3 and hereinafter referred to as the collar thread 4. A number of flexible rotation stops 6 extending outwardly in the manner of flaps or wings are associated with the outer surface of the inner container 5 in such a way that the outer edge of each rotation stop 6 projects beyond the outer surface 18 of the inner container 5 and is slidable past angular rotation stops 6 associated with the bottle neck 2 in one direction of rotation, in the manner of a ratchet, but will not permit movement in the opposite direction of rotation.

Preferably, as shown, the flexible rotation stops 6 are associated with the inner container 5 and the angular rotation stops 6' are associated with the bottle neck 2. This simplifies the manufacture of the bottle. Furthermore, if the bottle is to be used a number of times, the flexible rotation stops 6, which wear out more quickly, are advantageously associated with the inner container 5 which is usually used only once. Moreover, with this

- 8 -

arrangement, the clear space in the bottle neck can be used to an optimum degree, i.e. the space between the outer surface of the inner container and the inner wall of the bottle neck 2 can be restricted to a narrow slot; this is particularly true if the lower portion of the inner container is tapered as shown in Figure 1. In this way, best possible use can be made of the volume available for the concentrate 1 in the inner container in relation to the useful inner space in the bottle neck.

Figure 2b diagrammatically shows a cross section through the bottle neck and inner container level with the rotation stops 6 and 6'.

By combining the elements of bottle thread 17, collar thread 4 and rotation stop 6, 6' effective in one direction, it is possible to produce closure caps for a variety of applications: the rotation stop 6 acting in one direction, associated with the inner container 5 in Figures 1 and 2, is arranged so that it stops the direction of rotation which results in the inner container 5 being unscrewed from the collar 3. Moreover, collar thread 4 and bottle thread 17 are dimensioned relative to each other in such a way that the inner container 5 can be screwed up and unscrewed with fewer turns than are necessary in order to screw up the closure cap entirely by means of the bottle thread 17. Bearing these conditions in mind, the following possible combinations arise:

Collar thread 4 and bottle thread 17 have different directions of rotation, e.g. collar thread 4 is left-handed and bottle thread 17 is right-handed: when the closure cap containing the inner container 5 and the concentrate 1 is screwed up, the inner container 5 is thereby unscrewed from the collar thread 4 and the concentrate 1 mixes with the diluent 14.

In a second instance the collar thread 4 and bottle thread 17 have the same direction of rotation, e.g. both are right-handed as shown in Figure 1, and in this case the closure cap containing the inner container 5 and the concentrate 1 can be screwed up until a fixed abutment is obtained (this state is shown in Figure 2a). Thus when the closure cap is unscrewed, the inner container 5 is simultaneously unscrewed from the collar thread 4 and the concentrate 1 mixes with the diluent 14 before the bottle is opened.

The combination of individual features described hereinbefore is particularly suitable for a safety packaging system. Thus concentrate 1 and diluent 14 may be packaged by the manufacturer in the closure cap and bottle, and the two parts are screwed together and sold as a sealed unit. Since the concentrate 1 and diluent 14 are mixed together as the closure is unscrewed, before the bottle has been opened for removal of the contents, it is impossible to remove the concentrate 1 in undiluted form. This is of exceptional importance particularly when packaging concentrated pesticides for plants. The manufacturer can offer packages for sale in which the pesticidal liquor ready for use, or a semiconcentrate requiring further dilution, is only formed at the moment of opening the package.

Since the ratio of concentrate 1 and diluent 14 is determined by the manufacturer, any incorrect dosages caused by the user are prevented. Another important point is the fact that in packages of this kind the concentrate 1 cannot be accidentally taken out in undiluted form. The term "safety closure cap" is used in the text of this specification whenever the combination of elements according to the invention results in a closure cap from which the concentrate cannot be removed undiluted

- 10 -

when the closure cap has previously been placed on the bottle neck and is then unscrewed from the bottle neck by normal handling.

Closure caps with an unscrewable inner container 5 may also be fitted with rotation blocks which prevent rotation in both directions. Features of this type of closure cap according to the invention will now be explained with reference to Figure 3 and 4.

Figure 3 shows an inner container 5, the outer surface of which is formed with a plurality of radially outwardly pointing webs forming a rotation stop 6. Matching webs are provided as rotation stops 6' in the bottle neck 2. The closure cap associated with the bottle neck 2 consists of two parts as shown in Figure 3. One part 15, hereinafter referred to as the click-in cap, is associated with the bottle neck 2 and has in the base of the cap an opening arranged to receive a base element 16 carrying the collar 3, this base element being hereinafter referred to as the click-in base. The opening in the base of the click-in cap 15 is dimensioned so that the inner container 5, when screwed to the click-in base, can be pushed through until the click-in base 16 abuts firmly in the click-in cap 15. Divided closure caps of this kind are particularly suitable as safety closure caps.

The filling and sealing and the proper use of a system of this construction will now be explained in more detail with reference to Figure 4.

The manufacturer first screws the click-in cap 15 onto the bottle filled with the diluent 14. In a separate operation, the inner container 5 filled with the concentrate 1 is screwed tightly to the click-in base 16 and is then inserted through the upper opening in the click-in cap 15, which is already resting on the bottle neck, with the

rotation stops 6 and 6' offset relative to each other. The parts of the click-in closure which interconnect the click-in cap and the click-in base 16, namely the matching edge portions 20 and 19, are arranged so that after the base 16 has clicked into the cap 15 they are fixedly connected to one another and cannot be separated from the outside.

By suitable arrangement of the collar and bottle threads 4 and 17 the following effects can be achieved.

When the collar thread 4 and bottle thread 17 run in the same direction, when the closure cap is unscrewed, the inner container 5 is simultaneously unscrewed from the collar thread 4 and the concentrate 1 mixes with the diluent 14 before the bottle is open.

It is however particularly advantageous to combine threads of different directions of rotation, e.g. the collar thread 4 left-handed and the bottle thread 17 right-handed. The bottle thread may then be constructed so that in its bottom or full closed position it can be further rotated idly in the direction of closure. Threads of this kind are part of the prior art. Thus, as illustrated, the bottle neck 2 may have a complete thread, whilst the closure cap has a ring of radially arranged lens-shaped thread webs 21 at a certain height only in the lower region of the closure cap, these thread webs 21 travelling idly when the cap is rotated in the direction of closure below the lowest thread turn of the bottle thread, but being guided in the thread webs 22 of the bottle neck 2 when the closure cap is unscrewed.

However, as a result of the rotation stops 6 and 6', rotary movement of the closure cap in the opening direction causes a "rotary movement

- 12 -

in the direction of closure" to be transmitted to the collar thread 4. As a result, if the inner container 5 is already tight on the collar 3, the closure cap cannot be unscrewed. Instead, the closure cap must be deliberately turned further in the direction of closure until the inner container 5 is unscrewed from the collar 3. Only then is it possible to open the bottle, i.e. unscrew the closure cap.

10 A safety closure cap operating on the principle just described need not necessarily be produced in the divided form of the illustrated embodiment, i.e. with a click-in cap 15 and click-in base 16. With modern packaging technology it is also possible to press a closure cap, in which the inner container 15 containing the concentrate 1 is provided with rigid rotation stops 6, 6' and is already fixedly screwed to the collar thread 4 of the closure cap, onto the bottle neck vertically or with gentle rotation so as to achieve a sealed leaktight closure, without the rotation stops 6, 6' preventing the closure cap from being pressed on.

Divisible closure caps, on the other hand, have numerous advantages. Thus, little contact pressure is required to press in the click-in base 16. Furthermore, in the case of closure caps with collar and bottle threads arranged in opposite senses or with bottle and collar threads having different thread pitches, expensive divisible tools have to be used to produce integral closure caps by injection moulding. Owing to the different pitches of the bottle and collar threads 17, 4, it is not easy to unscrew the workpiece from the mould. On the other hand it is easy to produce the parts of the closure cap which carry the collar thread 4 and the bottle thread 17 in separate operations and then join the two parts together, possibly by a click-in closure.

The join 19, 20 of the click-in closure may, if desired, be sealed with hydrophobic adjuvants such as silicones or welded by heat treatment.

To improve the seal, one or more sealing lips 23 (Figure 4b) may be provided in the upper part of the closure cap above the bottle thread.

The invention also includes closure caps for two-component systems having an inner container 11 which is capable of being severed by the rotary movements; specific embodiments of this type are shown in Figures 5 to 7.

Referring back first to the closure cap known from British Patent 10 83 335, here the separable inner container is fitted onto the smooth cylindrical outer surface of the collar. Even when sealing lips in the form of clip stages are used, the concentrate enclosed in the inner container cannot be stored with absolute certainty. Concentrates such as concentrated plant pesticides generally contain a large proportion of emulsifier and/or a solvent with good solvating properties. Partly as a result of capillary action, also, the concentrate rises up through the sealing surface between the inner container and the collar. This leakage point cannot be remedied either by using sealing lips in this region or by applying sealing rings. Moreover, the concentrate is in constant contact with the weakened breaking point of the inner container. The plastics material swells and the weakened points changes in its mechanical properties. Furthermore, even a short-lived rise in the storage temperature, caused by volatile components of the solvent in the concentrate, can lead to the build-up of such a high internal pressure in the reservoir that the fitting of the inner container on the collar is loosened.

This problem is not solved with the features known from German Gebrauchsmuster 75 31 452. The



sealing problems are particularly noticeable here because the joint produced by clip stages between the base plate and the wall element must not lock too tightly since otherwise the base plate would

5 not drop away when the seal was broken.

Whereas in the closure caps so far described, fitted with an unscrewable inner container, the reservoir is opened when the inner container 5 is unscrewed from the collar thread 4, in a further  
10 embodiment of the present invention having a separable inner container, the inner container 11 has to be screwed further onto the collar thread 4 so that the lower part of the collar 3 acting as an abutment edge 7 severs the inner container 11,  
15 the separation preferably occurring along a thinner part 10 of the wall of the inner container, referred to as a weakened point. A particularly important feature here as compared with the prior art is the fact that the collar thread 4 also acts as  
20 a sealing element.

The collar thread 4, the bottle thread 17 and rotation stops 6, 6' may in turn be combined in different ways and used for closure caps with a separable inner container.

25 In the embodiment shown in Figure 5, the collar thread 4 and bottle thread 17 have the same direction of rotation and the same pitch. The rotation stop is formed by an annular flange 12 extending radially outwards from the upper end  
30 of the inner container, the flange being of such dimensions that it abuts on the upper edge of the bottle neck 2. In the preliminary closure position (Figure 5a) the closure cap containing the concentrate is screwed up until the annular flange 12 rests  
35 on the bottle neck. By further turning the closure cap in the direction of closure, the inner container 11 is screwed more firmly onto the collar thread

4, so that the lower part of the collar 3 constructed as an abutment edge 7 severs the inner container 11 along the weakened point 10 and thus opens up the reservoir into the diluent 14 (Figure 5b).

5       The annular flange 12, which simultaneously acts as a seal and a rotation stop during both the preliminary and the definitive closing of the bottle (Figure 5a, Figure 5b), may, on the one hand, block the rotation of the inner container 10 11 solely by the contact pressure acting on its abutment surface. It is also possible to provide the abutment surface between the annular flange 12 and the top edge of the bottle neck 2 with knobs, notches or serrations 13 so that the free rotation 15 of the inner container 11 is blocked even if there is little or no contact pressure.

      The inner container 11 screwed onto the collar 3 engages, by means of the collar thread 4, so tightly on the collar 3 that sealing rings 24 can 20 be inserted to seal the inner container. The concentrate 1 cannot affect the weakened point 10 during storage and cause it to swell up, nor can any volatile components in the concentrate loosen the fit of the inner container 11 on the collar 3 by producing 25 a high internal pressure.

      Figures 6 and 7 show embodiments of closure caps according to the invention with separable inner containers 11, in which the rotation stops 6 and 6', as already explained in detail hereinbefore, 30 are arranged on the outer surface of the inner container 11 and on the inner surface of the bottle neck 2 as blocking elements acting in one direction (Figure 7d) or in both directions of rotation (Figure 7c).

35       In contrast to the embodiment shown in Figure 5 in which the depth of suspension of the inner container is defined by the annular flange 12 abutting

- 16 -

on the bottle neck 2, the inner container in the  
embodiments of Figures 6 and 7 is freely movable  
in the vertical direction inside the bottle neck  
2 in accordance with the pitch of the collar thread  
4. Thus, closure caps with separable inner containers  
11 can be made available, in which the collar thread  
4 and bottle thread 17 have different pitches.  
The interaction of the individual elements will  
be explained more fully by way of example with  
reference to a two-part closure cap with a separable  
inner container 11.

Figure 6 shows, spatially separated, the  
individual elements: click-in cap 15 with a click-  
in base 16 which can be pressed into it, the collar  
3 being constructed as an abutment edge 7 at its  
lower edge and bearing the collar thread 4 arranged  
to receive the inner container 11, and two embodiments  
of a separable inner container 11 one with a flat  
base 8 and the other with a tub-shaped base 25  
extending from an annular step 9, the bottle neck  
2 being arranged to receive the closure cap by  
means of a bottle thread 17. The rotation stops  
associated with the inner container 11 and the  
bottle neck 2 are shown as rigid rotation stops  
6 and 6'.

First of all, the manufacturer fills the  
bottle with the diluent 14 and screws the click-  
in cap 15 onto the fill opening 2 as shown in Figure  
7a. In a second operation the click-in base 16,  
which is screwed to the inner container 11 containing  
the concentrate 1, is inserted through the upwardly  
open base of the click-in cap 15 so that the edge  
members 19 and 20, formed as a closure, interengage.  
If desired, the click-in closure may be protected  
from unauthorised opening by adhesive bonding or  
sealing at 19, 20.

Figure 7b shows the closure cap resting on  
the bottle neck 2 in the position ready for use.

The closure cap need not necessarily consist of the two elements of click-in base 16 and click-in cap 15; it may also be made in one piece and the bottle then sealed by pressing until the cap engages firmly on the bottle thread. Such methods are well established in packaging technology and need not be explained in detail. When the closure cap is pressed on directly in the vertical direction a lens-shaped partial thread 21 formed on the closure cap, as shown in Figure 3, is preferred.

The closure cap shown in its position ready for use in Figure 7b may if desired be additionally sealed to prevent the contents of the bottle from running out by means of sealing lips on the click-in cap 15, bottle neck 2, collar 3 or inner container 11.

If the bottle thread 17 and collar thread 4 have opposite directions of rotation, then when the closure cap is unscrewed the inner container 11 is screwed more tightly to the collar 3, and the abutment edge 7 resting on the base 8 or on the annular step 9 of the inner container 11 severs the inner container 11 along the weakened line 10 and the concentrate 1 and diluent 14 are mixed together before the closure cap has been fully unscrewed.

The combination of collar and bottle threads 4, 17 extending in the same direction is also feasible: then, from the closed position (Figure 7b), the cap must be screwed up further in the direction of closure in order to sever the inner container 11. Such severance will be apparent to the user by the sudden reduction in the force necessary to turn the cap; this effect occurs with all screw caps with a separable inner container 11 and can be regarded as a reliable indication that the concentrate 1 and diluent 14 have been mixed.

When in the case of collar and bottle threads 4, 17 extending in the same direction, the inner container can be unscrewed from the collar 3 with fewer turns than are necessary to open the bottle completely, the inner container 11 falls away even before the closure cap is fully unscrewed and the concentrate 1 and diluent 14 are at once mixed together; therefore the concentrate 1 cannot be removed in undiluted form.

Thus, both closure caps with the collar and bottle threads 4, 17 running in opposite directions, and also closure caps in which the threads are in the same direction, satisfy the requirements which are imposed on safety closure caps.

Moreover, closure caps with a separable inner container 11 and rotation stops 6, 6' acting in only one direction (Figure 7d) are also within the scope of the invention. Such rotation stops 6, 6' effective in one direction, which may be provided on the outer surface of the inner container 11 (Figure 7d) and on the inner surface of the bottle neck 2 respectively, are arranged to block screwing up operation of the collar thread 4 but not unscrewing. Although rotation stops effective in one direction may thus be used in two-part closure caps, the use of such rotation stops is preferred in one-part closure caps. Where the thread of the collar and bottle are in the same direction, the rotation stops 6, 6' act to block the screwing up of the closure cap.

The inner container 11 is screwed onto the collar 3 and severed along the weakened line 10 by means of the abutment edge 7. Closure caps of this kind satisfy the requirements for a two-component system in which the closure cap containing the concentrate is sold separately from the bottle and the bottle and closure cap are only combined by the final user.

In another embodiment the collar and bottle threads 4, 17 extend in opposite directions. This embodiment satisfies the requirements imposed on a safety closure cap system: the manufacturer  
5 screws the closure cap containing the concentrate 1 to a bottle into which the diluent 14 has already been poured. The rotation stops 6, 6' effective in one direction (Figure 7d) do not block this operation since in the case of threads formed in  
10 different directions the "close" direction of rotation for the bottle thread 17 corresponds to a non-blocking sliding of the flexible stop 6 over the other rotation stop 6. Only when the sealed bottle is opened by the user do the rotation stops 6, 6' act, whereby  
15 the inner container 11 is screwed onto the collar 3 and the abutment edge 7 severs the reservoir along the weakened line (10).

A major advantage of closure caps with a separable inner container 11 with no restriction  
20 to the depth of suspension by an annular flange such as 12, is the fact that the pitch of the bottle thread 17 and collar thread 4 can be chosen independently of each other. In the two-component system known from British Patent 1 083 335, the abutment  
25 edge of the collar is screwed into the bottle neck by an amount corresponding to the pitch of the bottle thread. Since at the same time the depth of suspension of the cup is limited by an annular flange abutting on the bottle opening, only limited  
30 pressure can be exerted on the weakened point, which means that this weakened point must be sufficiently thin. In practice, however, problems of leaktightness particularly occur with excessively thin weakened points. If, as just mentioned, the pitch of the  
35 collar and bottle threads 4, 17 can be selected independently of each other, by using a collar thread 4 with a small pitch it is possible to exert

- 20 -

substantially greater force on the weakened point 10 by means of the abutment edge 7. Therefore weakened points may be produced from thicker layers of material, resulting in a significant improvement in the leaktightness.

A general advantage of closure caps with a separable inner container 11 is the fact that, after the base 8 or the base tub 25 has been severed, the concentrate 1 enclosed in the reservoir flows out unimpeded, i.e. the concentrate 1 and diluent 14 are automatically mixed without any need to shake the bottle.

Everything that has been said makes it clear that apparatus according to the invention, at least in its preferred forms, provides two-component packaging systems with greater leaktightness, safety of use, and improved operability.

The question of the choice of material for the reservoir and the entire closure cap can be resolved in terms of the requirements applying to the concentrate and diluent. The (one-part) inner container may be made of glass, ceramics, plastics, metals, cardboard or other materials, but in the case of inner containers with a weakened point the weakened point may restrict the choice of material. Owing to the fact that the collar thread also acts as a sealing element, by choosing specific forms of thread and inserting seals or gaskets it is possible to achieve a substantial improvement in leaktightness compared with the known closures.

It is to be clearly understood that there are no particular features of the foregoing specification, or of any claims appended hereto, which are at present regarded as being essential to the performance of the present invention, and that any one or more of such features or combinations

thereof may therefore be included in, added to,  
omitted from or deleted from any of such claims  
if and when amended during the prosecution of this  
application or in the filing or prosecution of  
5 any divisional applicaion based thereon.



- 22 -

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A two component package comprising a bottle and a closure cap mounted rotatably thereon, said closure cap including a reservoir for receiving a concentrate, wherein:

(a) the closure cap has a collar arranged to extend into a neck of the bottle from a base of the closure cap, and

(b) said collar formed with a collar thread to engage an inner surface of ~~an outer wall of~~ a hollow cylindrical inner container, said container being closed at one end by a base thereby forming said reservoir, and

(c) between said inner container and said bottle neck, a rotation stop means is provided which prevents free rotation of the inner container.

2. A two component package as claimed in claim 1 wherein said inner container includes a frangible portion and said collar is formed with an abutment edge at its lower end which engages said frangible portion of said inner container such that when the inner container, screwed onto the collar thread, is rotated in a direction of engagement with the collar thread, the frangible portion is severed from said inner container.

3. A two component package as claimed in claim 2 wherein said inner container has, on its upper portion, an annular flange which extends radially outward and abuts on the bottle neck, such annular flange defining a depth of suspension of the inner container into the bottle and acting to block free rotation of the inner container.

4. A two component package as claimed in claim 1 or 2 wherein said rotation stop means is provided between an outer wall of said inner container and an inner wall of said bottle neck.

5. A two component package as claimed in any one of claims 1 to 4 wherein said closure cap is releasably



connected to the bottle neck by means of a bottle thread.

6. A two component package as claimed in claim 5 wherein the closure cap rotates freely in the direction of closure when said cap reaches a closed position.

7. A two component package as claimed in claim 5 or 6 wherein the collar thread and the bottle thread have different directions of rotation.

8. A two component package as claimed in claims 5 or 6 wherein the collar thread and the bottle thread have the same direction of rotation.

9. A two component package as claimed in any one of claims 5 to 8 wherein the collar thread and the bottle thread have different pitches.

10. A two component package as claimed in any one of claims 5 to 8 wherein the collar thread and the bottle thread have the same pitch.

11. A two component package as claimed in any one of the preceding claims wherein rotation stop means is effective in one direction only, and combines with said collar thread to block rotary movement of said inner container in said one direction such that rotation of said closure cap in said one direction rotates said collar in the direction of disengagement with respect to said inner container.

12. A two component package as claimed in claim 2 and in any one of claims 3 to 9 wherein said rotation stop means is effective in one direction only and combines with said collar thread to block rotary movement of said inner container in said one direction such that rotation of said closure cap in said one direction rotates said collar in the direction of engagement with respect to said inner container.

13. A two component package as claimed in any one of the preceding claims wherein said collar includes an annular base portion and said closure cap includes a complementary



portion, such that said complementary portion is engageable with said base portion by means of an interference fit.

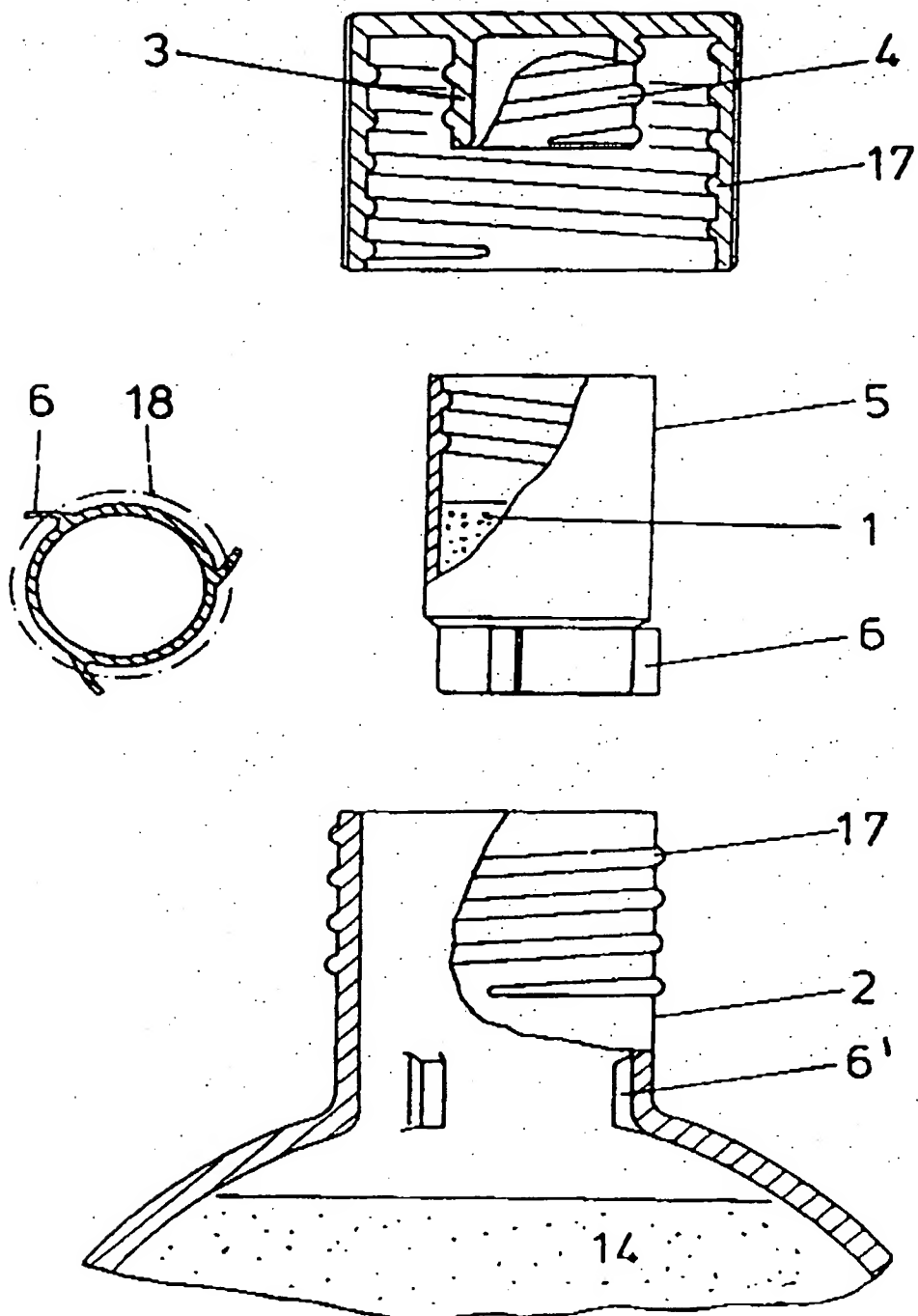
14. A two component package as hereinbefore described with reference to the accompanying drawings.

DATED this 14th day of February 1989

CELAMERCK GMBH & CO. KG.  
Patent Attorneys for the  
Applicant:

F.B. RICE & CO.

FIG. 1



52483/86

FIG. 2a

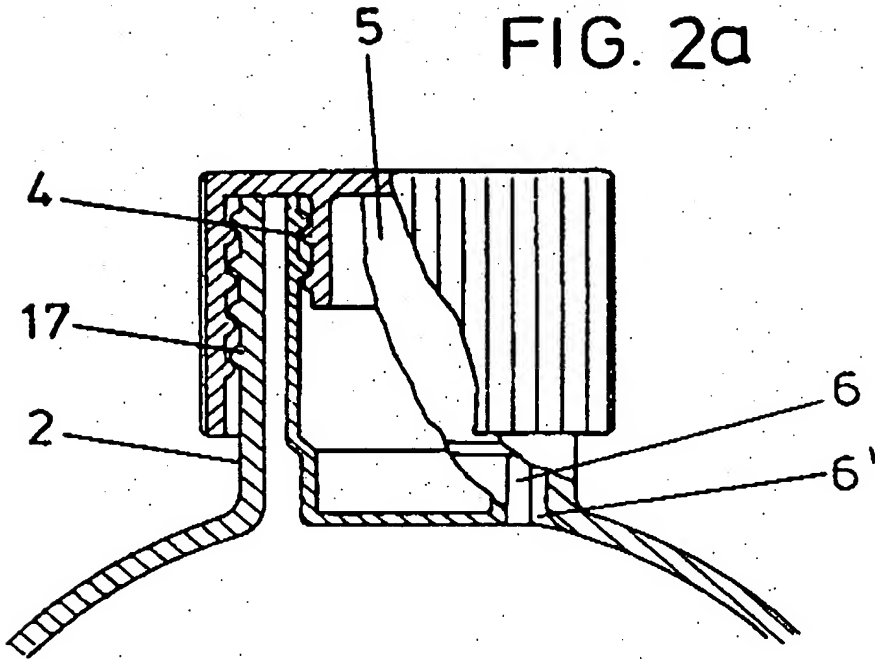


FIG. 2c.

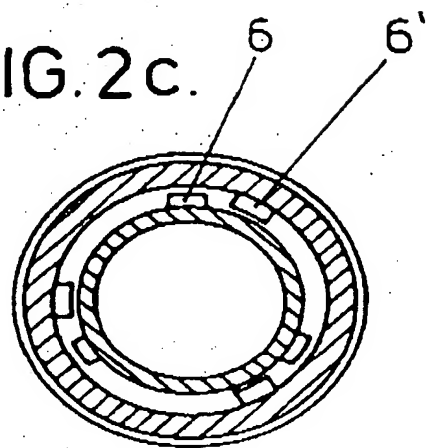
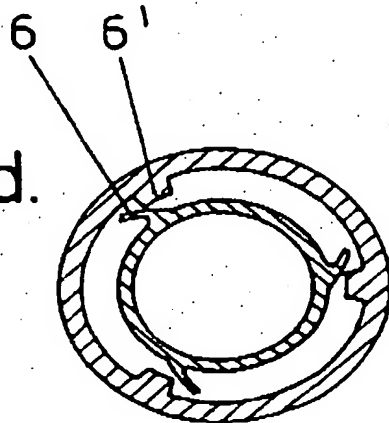


FIG. 2d.



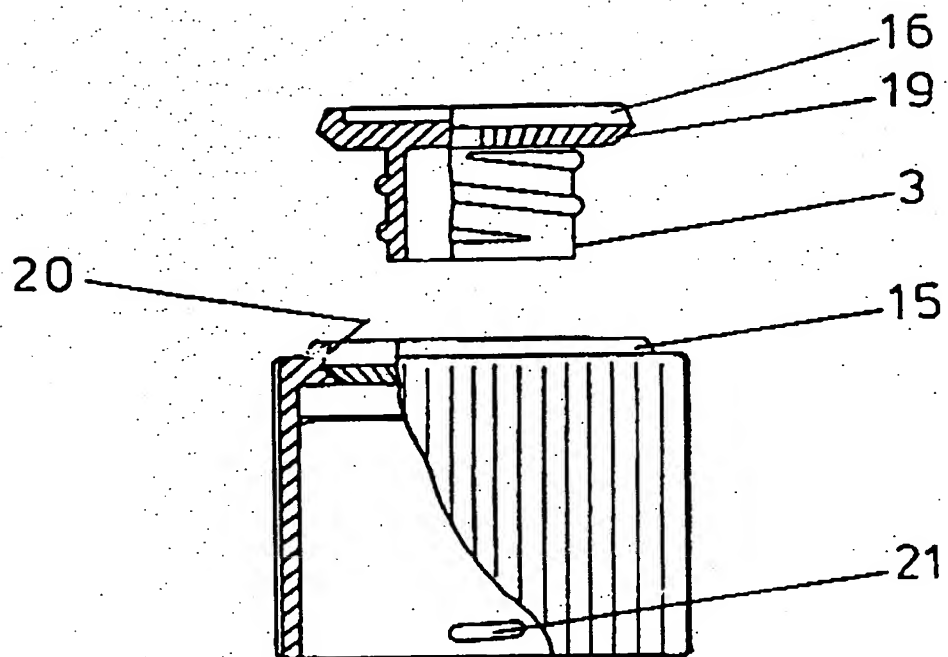


FIG. 3.

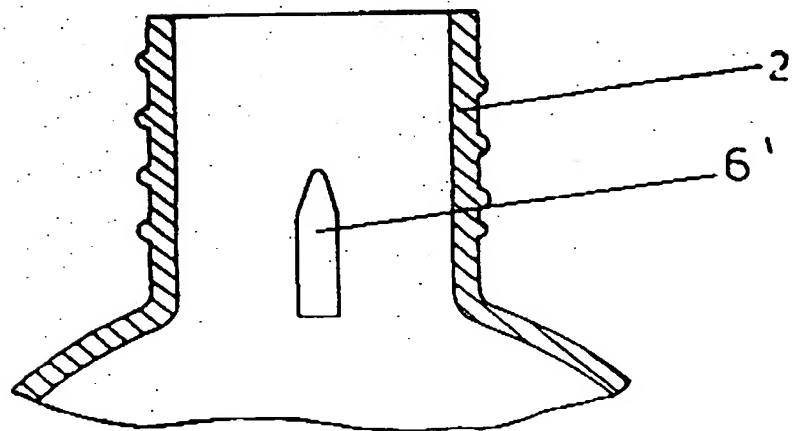
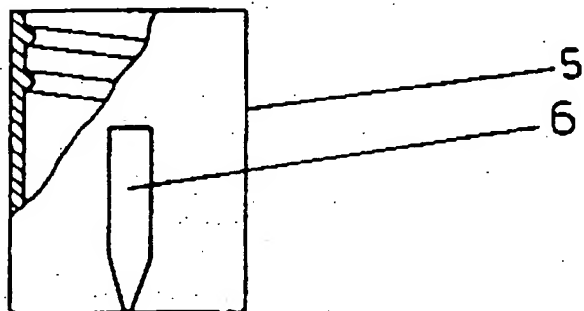


FIG. 4a.

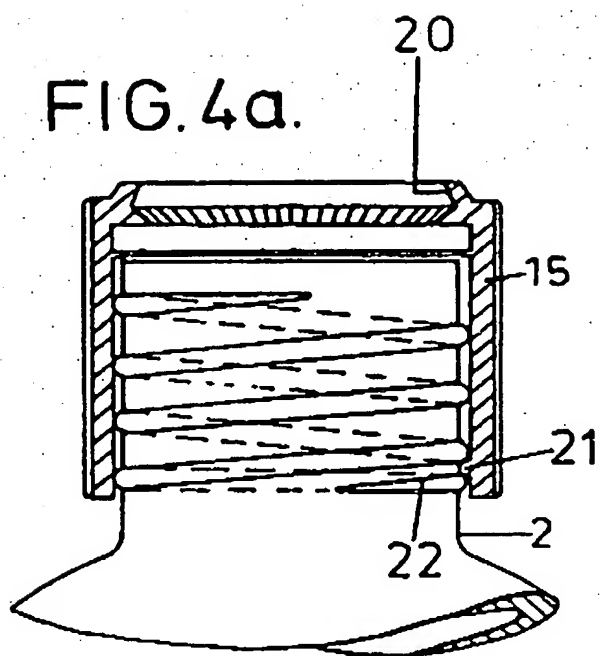


FIG. 4d.

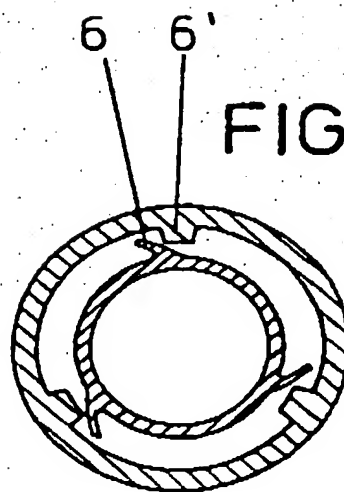
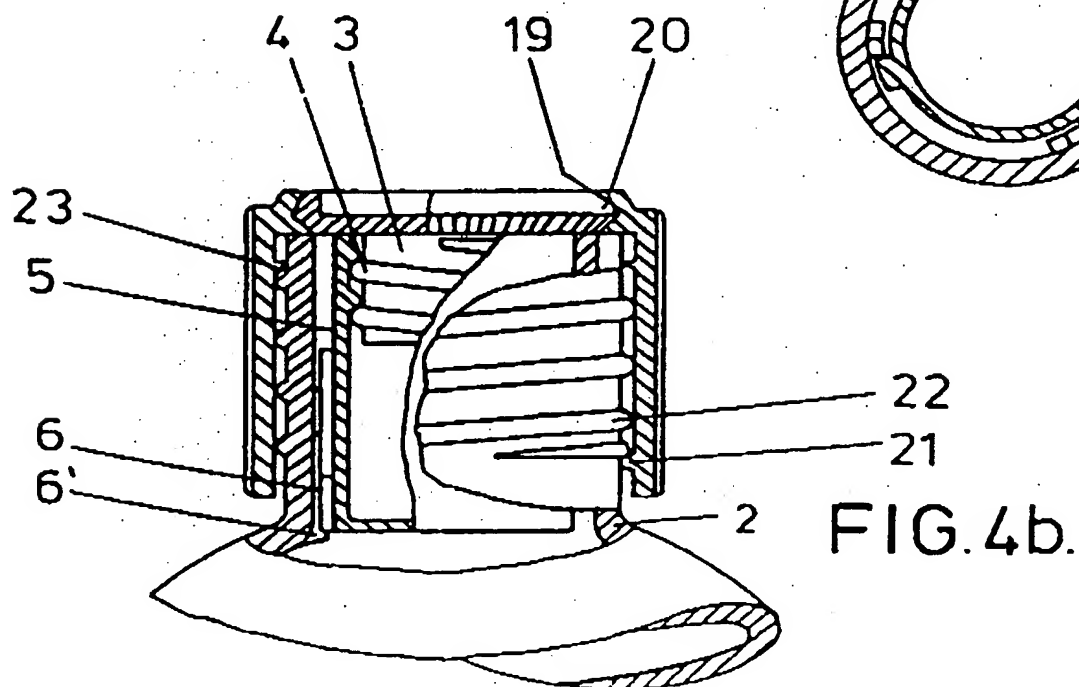
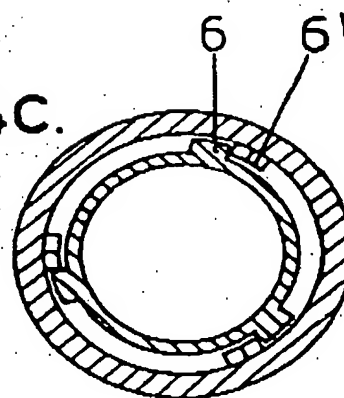


FIG. 4c.



524 83/86

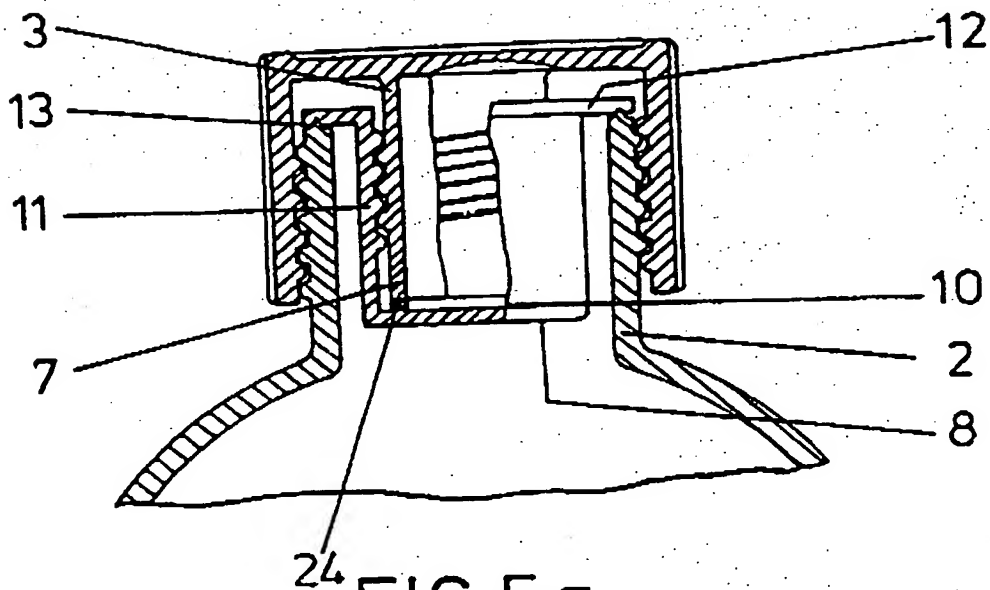


FIG. 5a.

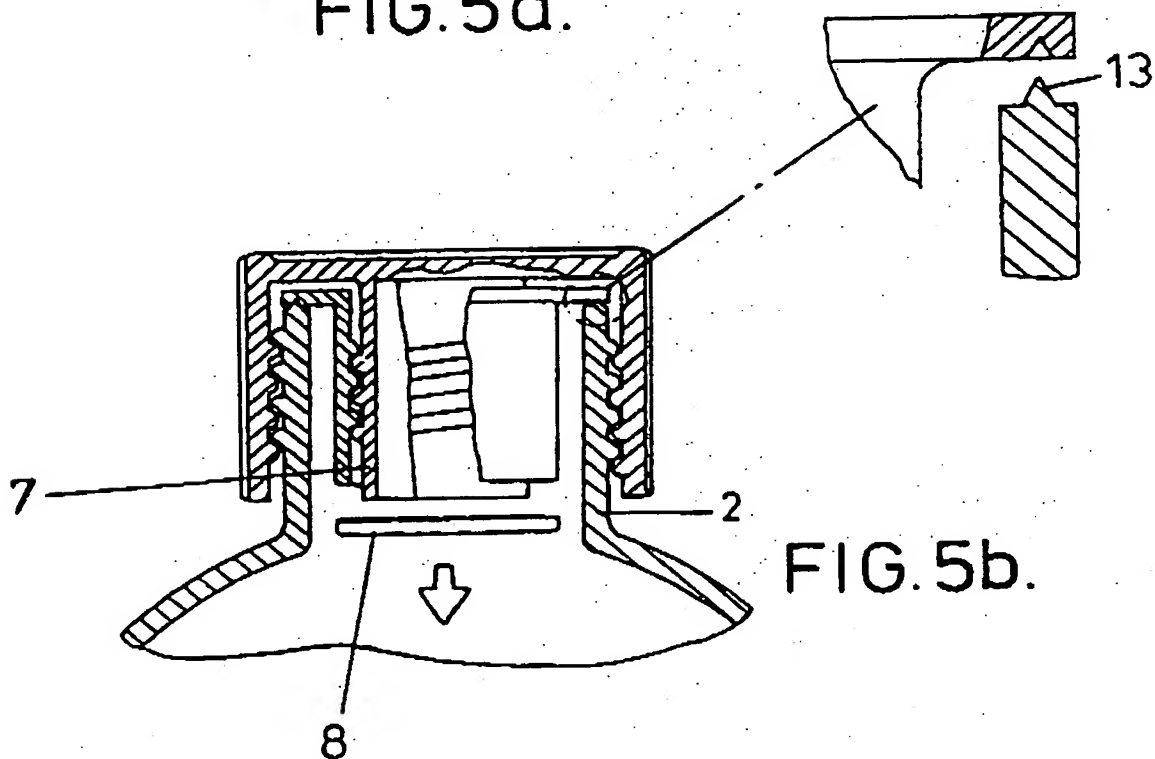


FIG. 5b.



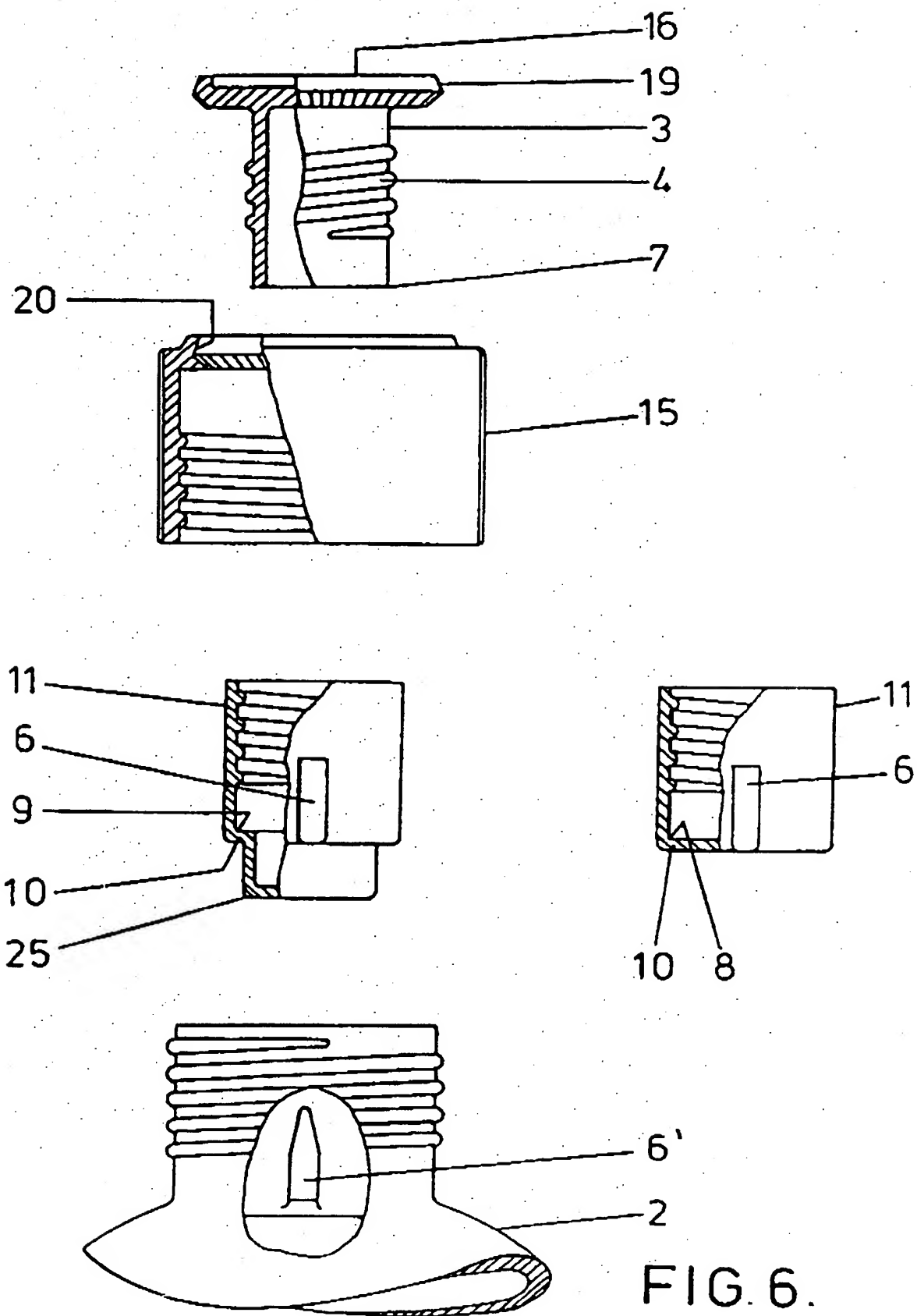


FIG. 6.

52483/86

FIG.7a.

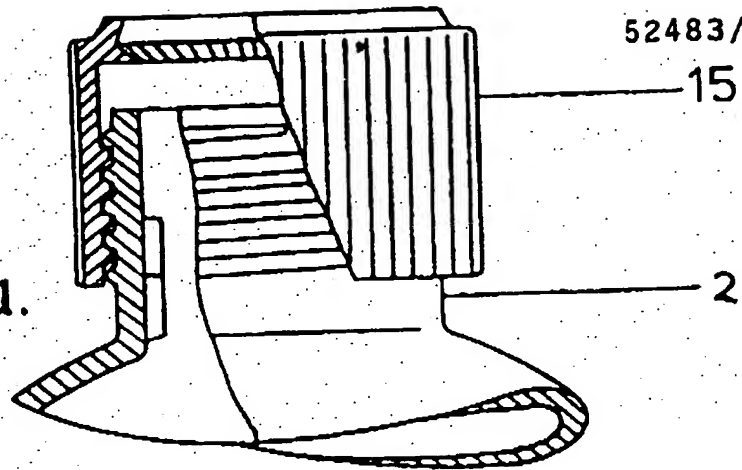


FIG.7b.

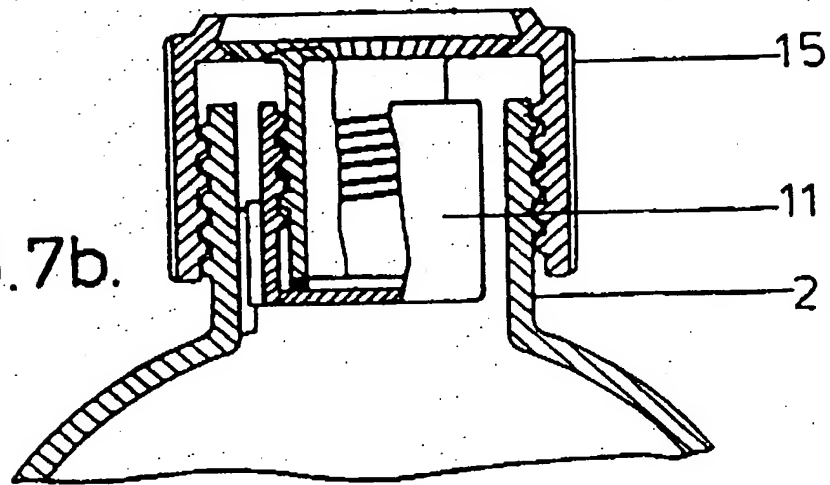


FIG.7c.

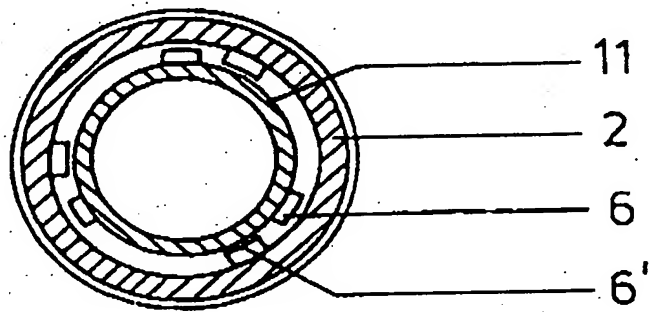
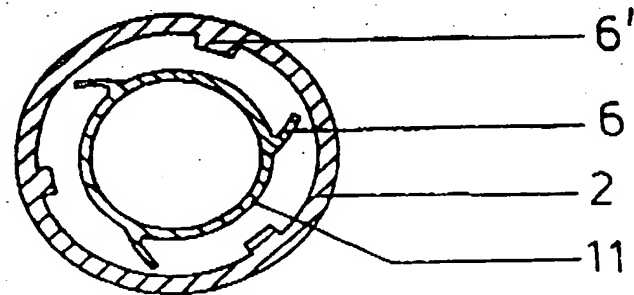


FIG.7d.



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